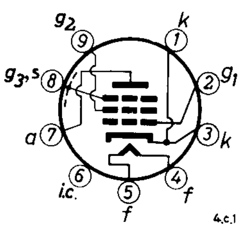
S.Q. TUBE

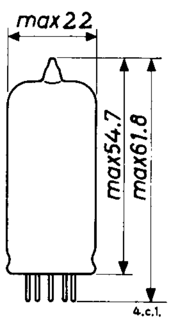
Special quality pentode designed for use as wide band amplifier

QUICK REFERENCE DATA			
Life test	10 000 hours		
Low interface resistance			
Base	Noval. Gold plated pins		
Heating	Indirect A.C. or D.C.; Parallel supply		
Heater voltage	V_f	6.3	V
Heater current	I_f	315	mA
Anode current	I_a	22	mA
Mutual conductance	S	35	mA/V
Equivalent noise resistance	R_{eq}	150	Ω

DIMENSIONS AND CONNECTIONS Dimensions in mm

Base: Noval





CHARACTERISTICS

Column I Nominal value or setting of the tube
II Range values for equipment design: Initial spread
III Range values for equipment design: End of life

		I	II	III	
Heater voltage	V_f	6.3			V
Heater current	I_f	315	299	331	mA
Anode supply voltage	V_{ba}	190			V
Grid No.2 supply voltage	V_{bg_2}	160			V
Grid No.3 voltage	V_{g_3}	0			V
Grid No.1 supply voltage	$+V_{bg_1}$	10			V
Cathode resistor	R_k	400			Ω
Anode current	I_a	22	21 - 23	min. 20	mA
Grid No.2 current	I_{g_2}	6.0	5.4 - 6.6		mA
Internal resistance	R_i	120			kΩ
Mutual conductance	S	35	30 - 40	min.24.5	mA/V
Amplification factor	$\mu_{g_2g_1}$	80			
Negative grid current	$-I_{g_1}$		max.0.3	max. 1.0	µA
Equivalent noise resistance	R_{eq}	150			Ω
Input resistance Frequency = 100 MHz pin No.1 connected to pin No.3	R_{g_1}	1			kΩ
$\frac{S}{2\pi} \cdot \frac{1}{C_{g_1(hot)} + C_a + 5\ pF}$		230			MHz
Noise factor Frequency = 100 MHz (Adapted to minimum noise)	F	7			dB
Phase angle of slope Frequency = 100 MHz	φ_s	22			o

CHARACTERISTICS (continued)

As triode (grid No.2 connected to anode)		I	II	
Anode supply voltage	V_{ba}	160		V
Grid No.3 voltage	V_{g_3}	0		V
Grid No.1 supply voltage	$+V_{bg_1}$	10		V
Cathode resistor	R_k	470		Ω
Anode current	I_a	24		mA
Mutual conductance	S	41		mA/V
Amplification factor	μ	77		
Internal resistance	R_i	1.9		kΩ
Equivalent noise resistance	R_{eq}	65		Ω
Insulation resistance between anode and other electrodes Voltage between electrodes = 300 V	R_{ins}		min. 500	MΩ
Insulation resistance between grid No.1 and other electrodes Voltage between electrodes = 50 V	R_{ins}		min. 200	MΩ
Leakage current between cathode and heater Voltage between cathode and heater = 100 V	I_{kf}		max. 5	μA

CAPACITANCES

Without external shield.

Grid No.1 to grid No.2, grid No.3, cathode, heater and screen	C_{g_1/g_2g_3kfs}	10	9 - 11	pF
Grid No.1 to grid No.2, grid No.3, cathode, heater and screen Cathode current = 28 mA	C_{g_1/g_2g_3kfs}	17		pF
Anode to grid No.2, grid No.3, cathode, heater and screen	C_{a/g_2g_3kfs}	2.1	1.8 - 2.4	pF

CAPACITANCES (continued)		I	II	
Anode to grid No.1	C_{ag_1}		max. 40	mpF
Anode to cathode	C_{ak}		max. 50	mpF
Anode to cathode and grid No.2	C_{a/kg_2}	0.32	0.28-0.36	pF
Anode to cathode, grid No.2 and grid No.3	C_{a/kg_2g_3}	2.0	1.7- 2.3	pF
Anode to heater	C_{af}		max. 100	mpF
Grid No.1 to cathode	C_{g_1k}	6.8	6.1- 7.5	pF
Grid No.1 to cathode and grid No.2	C_{g_1/kg_2}	9.5	8.5-10.5	pF
Grid No.1 to cathode, grid No.2 and grid No.3	C_{g_1/kg_2g_3}	10	9- 11	pF
With external shield.				
Grid No.1 to grid No.2, grid No.3, cathode, heater and screen	C_{g_1/g_2g_3kfs}	10.1	9.1-11.1	pF
Grid No.1 to grid No.2, grid No.3, cathode, heater and screen Cathode current = 28 mA	C_{g_1/g_2g_3kfs}	17.1		pF
Anode to grid No.2, grid No.3, cathode, heater and screen	C_{a/g_2g_3kfs}	3.3	2.9- 3.7	pF
Anode to grid No.1	C_{ag_1}		max. 35	mpF
As triode. Without external shield. Grid No.3 connected to cathode				
Grid No.1 to grid No.3, cathode, heater and screen	C_{g_1/g_3kfs}	7.3		pF
Anode and grid No.2 to grid No.3, cathode, heater and screen	C_{ag_2/g_3kfs}	3.1		pF
Anode and grid No.2 to grid No.1	C_{ag_2/g_1}	2.7		pF
As triode. Without external shield Grid No.3 connected to anode				
Grid No.1 to cathode, heater and screen	$C_{g_1/kfs}$	6.7		pF
Anode, grid No.2 and grid No.3 to cathode, heater and screen	$C_{ag_2g_3/kfs}$	1.0		pF
Anode, grid No.2 and grid No.3 to grid No.1	$C_{ag_2g_3/g_1}$	3.3		pF

LIFE

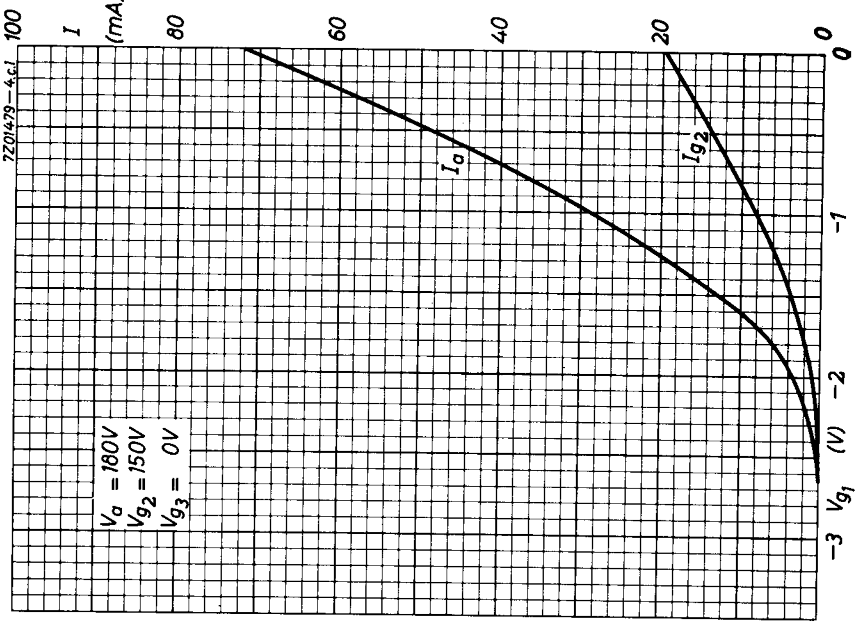
Production samples are tested to be within the end of life values (column III) during 10 000 hours.

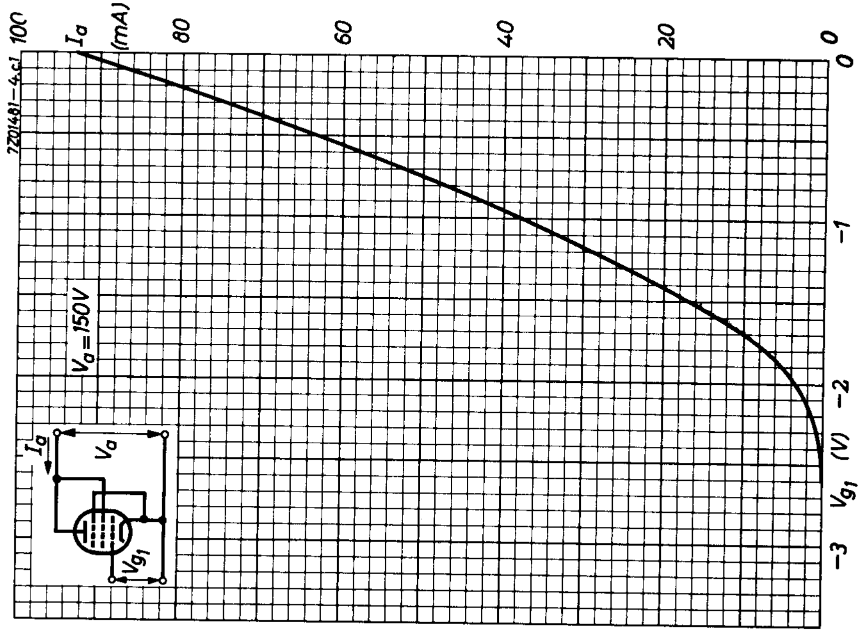
LIMITING VALUES (Design centre rating system, if not otherwise specified)

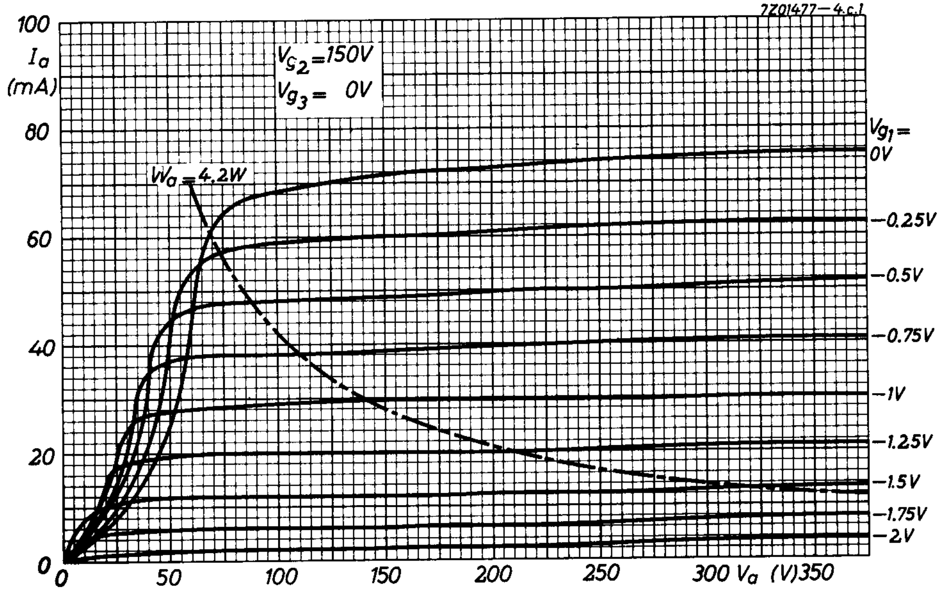
Anode voltage		V_{ao}	max.	400	V
		V_a	max.	220	V
Anode dissipation	Des. centre	W_a	max.	4.2	W
	Abs. max.	W_a	max.	4.5	W
Grid No.2 voltage		V_{g2o}	max.	400	V
		V_{g2}	max.	180	V
Grid No.2 dissipation	Des. centre	W_{g2}	max.	1.0	W 1)
	Abs. max.	W_{g2}	max.	1.1	W 1)
Anode plus grid No.2 dissipation (triode connected)		W_{a+g2}	max.	4.5	W
Grid No.1 voltage		$-V_{g1}$	max.	30	V
		$+V_{g1}$	max.	0	V
Cathode current	Des. centre	I_k	max.	30	mA
	Abs. max.	I_k	max.	33	mA
Grid resistor (Automatic bias)		R_{g1}	max.	0.5	MΩ
Voltage between cathode and heater					
cathode positive		V_{kf}	max.	120	V
cathode negative		V_{kf}	max.	60	V
Bulb temperature	Abs. max.	t_{bulb}	max.	190	°C

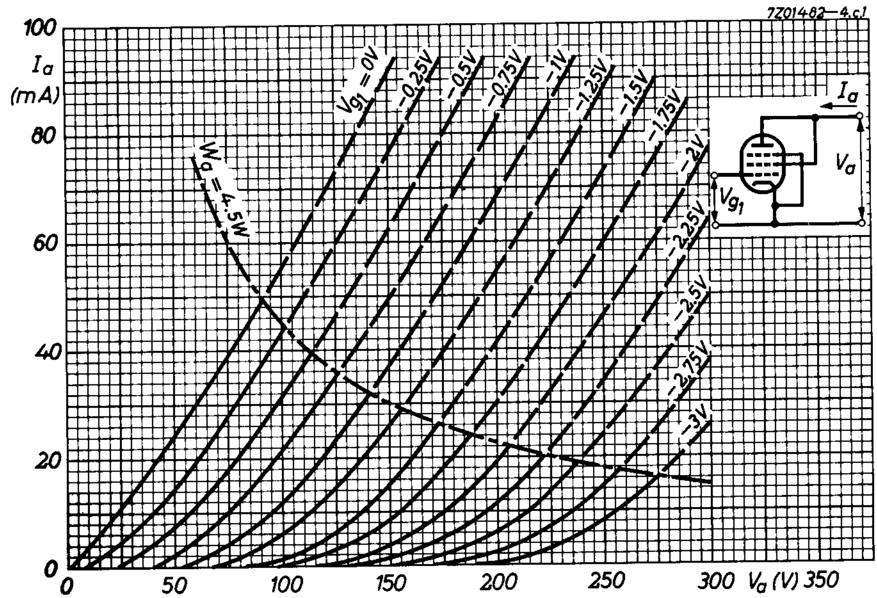
Heater voltage: The average heater voltage should be 6.3 V.
Variations of the heater voltage exceeding the range of 6.0 V to 6.6 V will shorten the tube life.
The tolerance of heater current (column II) should be taken into account.

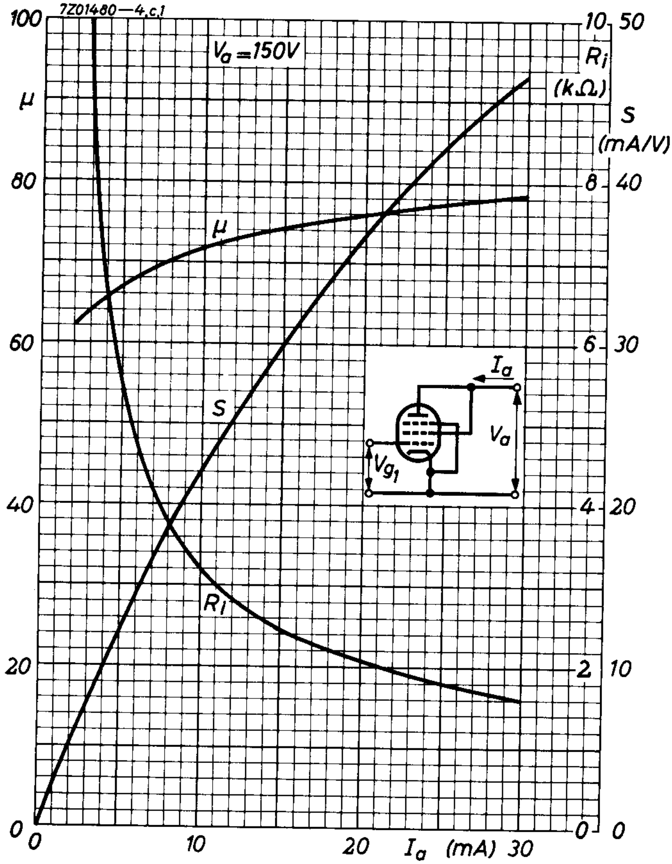
1) Care should be taken not to exceed the rated W_{g2} values due to switching of positive supply voltages.
If the cathode is shunted by a capacitance > 10 μF a series resistor of minimum 1 kΩ should be inserted in the grid No.1 lead.


7Z01479-4.c.l
I (mA)
100
80
60
40
20
0
I_a
I_{g_2}
V_a = 180V
V_{g_2} = 150V
V_{g_3} = 0V
V_{g_1} (V)
0
−1
−2
−3


7Z01481-4.c.l
I_a (mA)
100
80
60
40
20
0
V_a=150V
I_a
V_a
V_{g_1}
V_{g_1} (V)
0
−1
−2
−3


7Z01477—4.c.1
100
I_a
(mA)
80
60
40
20
0
V_{g_2}=150V
V_{g_3}= 0V
W_a = 4.2W
V_{g_1}=
0V
−0.25V
−0.5V
−0.75V
−1V
−1.25V
−1.5V
−1.75V
−2V
0
50
100
150
200
250
300 V_a (V)350


7Z01482—4.c.1
100
I_a
(mA)
80
60
40
20
0
W_a = 4.5W
V_{g_1} = 0V
−0.25V
−0.5V
−0.75V
−1V
−1.25V
−1.5V
−1.75V
−2V
−2.25V
−2.5V
−2.75V
−3V
I_a
V_a
V_{g_1}
0
50
100
150
200
250
300 V_a (V) 350


7Z01480—4.c.1
V_a =150V
μ
S
R_i
R_i (kΩ)
S (mA/V)
I_a (mA)
I_a
V_a
V_{g1}
100
80
60
40
20
0
10
8
6
4
2
50
40
30
20
10
0
10
20
30

PHILIPS

Data handbook

Electronic components and materials

D3a

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